

GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL ENGINEERING (06) ADVANCED CONSTRUCTION AND EQUIPMENTS SUBJECT CODE: 2160601 B.E. 6th SEMESTER

Type of course: The core subject of civil engineering.

Prerequisite: Study of building construction.

Rationale: The study of advanced construction and equipments is necessary for civil engineers..

Teaching and Examination Scheme:

| Teaching Scheme | | | Credits | Examination Marks | | | | | | Total Marks |
|-----------------|---|---|---------|-------------------|--------------|-----|---------|-----------------|--------|-------------|
| L | T | P | | C | Theory Marks | | | Practical Marks | | |
| | | | ESE (E) | | PA (M) | | ESE (V) | | PA (I) | |
| | | | | | PA | ALA | ESE | OEP | | |
| 3 | 1 | 0 | 4 | 70 | 20 | 10 | 30 | 0 | 20 | 150 |

Content:

| Sr. No. | Content | Total Hrs. | % Weightage |
|----------|--|---|-------------|
| 1 | Module - I | | 20 |
| | <p>Pile Foundations:</p> <p>Introduction, uses, selection of pile, types of piles, pile cap and pile shoe, pile driving methods, micro piling, causes of failures of piles, Heaving of piles</p> <p>Caissons:</p> <p>Definition, uses, construction material, types of caissons, loads on caisson, design features of caissons, floating of caissons, cutting edges, sinking of caisson, tilting of caisson, shifting of caisson, caisson diseases</p> | 04 04 | |
| 2 | Module – II | | 10 |
| | <p>Diaphragm wall construction</p> <p>Introduction, uses, site selection criteria</p> <p>Coffer Dams:</p> <p>Definition, uses, selection of coffer dams, types of coffer dams, design features of coffer dams, leakage prevention, economic height</p> <p>Control of Ground water in Excavations:</p> <p>Methods-pumping, well points, bore wells, electro-osmosis, injections with cement, clays and chemical, freezing process, vibro- flotation.</p> | 01 02 02 | |

| | | | |
|-----------|--|--|-----------|
| 3 | Module - III | | 20 |
| | <p>Form work</p> <p>Form work for R.C.C. Wall, slab, beam and column, centering for arches of large spans and dams, design features for temporary works, slip formwork, False work for Bridges</p> <p>Construction of tall structures.</p> <p>Materials of tall structures. Structural system for tall structures.</p> <p>Methods of construction of tall structures.</p> <p>Demolition of Structure:</p> <p>Demolition, taking down, dismantling, methods, safety</p> | <p>04</p> <p>03</p> <p>01</p> | |
| 4 | Module – IV | | 10 |
| | <p>Construction Equipment :</p> <ol style="list-style-type: none"> 1. Mechanization in Construction: Importance of construction equipments their classification, selection and contribution rate of production (Output), Owning and operating cost. 2. Engineering fundamentals : Related to performance of IC engines, rimpull, drawbar pull, Coefficient of traction, Gradability. | <p>02</p> <p>03</p> | |
| 5 | Module – V | | 20 |
| | <p>Excavating equipments :</p> <ul style="list-style-type: none"> • Selection, basic parts, operation, factors affecting output • Tractors and related equipment: Bulldozers, Rippers, Scrapers • Excavating Equipment: Power shovels, Draglines, Hoes, Clam shells and trenching machines. | <p>08</p> | |
| 6. | Module - VI | | 20 |
| | <p>Hauling and conveying equipments :</p> <ul style="list-style-type: none"> • Belt conveyor system : Terminology, Classification, Components, Power requirement estimation and design. • Hauling and lifting equipment: Trucks, wagons, cranes etc. • Pile boring / driving equipment • Concrete Batching plant • Tunnel Boring machines • Crushers • Air compressors • Drilling and blasting equipments | <p>08</p> | |

Suggested Specification table with Marks (Theory):

| Distribution of Theory Marks | | | | | |
|------------------------------|---------|---------|---------|---------|---------|
| R Level | U Level | A Level | N Level | E Level | C Level |
| 30 | 40 | 30 | 0 | 0 | 00 |

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Building Construction by B.C.Punamia
2. Building Construction by S.C.Rangwala
3. Building Construction by Gurucharan Singh
4. Heavy Construction by Vazirani & Chandola
5. Construction, Planning, Equipment and Methods by R.L.Peurifoy
6. Building Construction By Dr. Jha & S.K. Sinha
7. Hand book of Heavy construction: O'Brien, Havers & Stubb
8. Construction Engineering and Management By S.Seetharaman
9. Construction Equipment and Its Management By S C Sharma
10. Construction Equipment By Jagdish Lal
11. Construction equipment and its planning and application By Mahesh Verma Metropolitan Book Co.,

Course Outcome:

After learning the course the students should be able to:

1. Supervise the heavy construction sites.
2. Understand the working principle and use of various equipments
3. Select appropriate construction equipments for desired construction works.
4. Execute the operations of Demolition of structures with safety.
5. Erect the false work for Bridges and form work for Heavy structures

List of Tutorials:

There shall be at least one construction site visit and students shall prepare visit report.

1. The student shall visit the construction failure site and investigate the reasons of failure under supervision of faculty member.
2. Student shall actually observe the working of construction equipment and work out the out put of equipment from site observations the and compare it with that claimed by manufacturer.
3. The student shall work out the number of trucks required for hauling earth continuously with zero waiting period at sites requiring heavy excavation and hauling of earth
4. Workout owning and operating cost from field observations.
5. Contact the construction equipment manufacturer visit the factory and suggest their views in a visit report.

6. Work out how much money is saved daily by employing machines at construction sites, instead of labour force.

Major Equipment:

Working models of various construction equipments.

List of Open Source Software/learning website:

<http://www.equipmentworld.com/>
www.constructionequipment.com

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.